

# Project Execution - PM Elements

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## Introduction

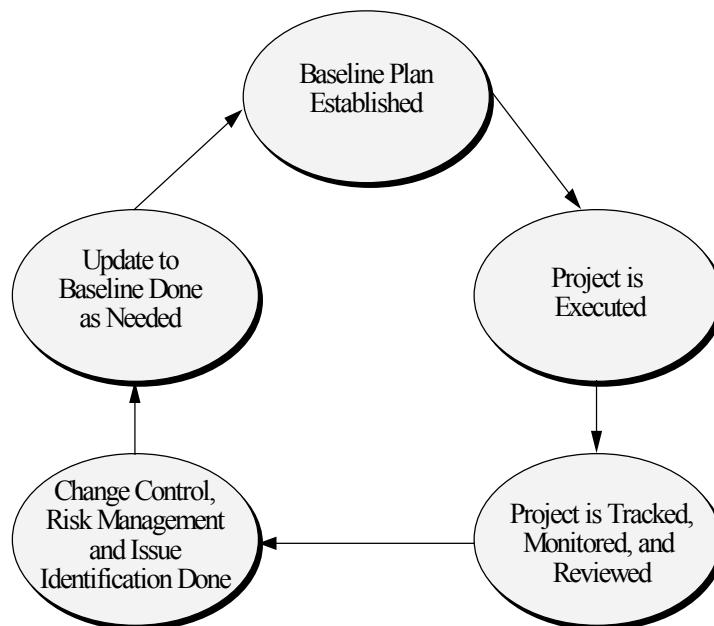
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### ***What Happens During Project Execution?***

Once a project reaches the execution phase, a project team and the necessary resources should be in place to perform the project tasks. The project plan should have been developed, fine tuned and baselined.

The project team shifts its focus from planning to participating, observing, analyzing and producing the project deliverables. The project manager now focuses on “working the plan”. This process is graphically presented below.

#### **Management During Project Execution**



The critical elements for the project management team are:

- Track and monitor project activities to measure actual performance to planned performance
- Review and communicate status and future actions
- Monitor and mitigate potential risks
- Execute a rigorous change management process to control changes to the project's objectives, specifications and overall definition
- Execute an issue tracking process to ensure that there is a central repository for project issues that are addressed in a timely fashion
- Have in place a process to document and track plans to correct an issue that impacts the plan and which establishes guidelines for re-planning.

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### ***Project Control Process***

The project plan serves as the basis for the project's monitoring, controlling and reporting activities. By following the plan and gathering relevant data for the status meetings and reports, information will be available to accurately identify issues and problems; minimize project risks; and monitor, control, and report progress.

Once a project has been baselined and project execution starts, then it needs to be directed. This next series of documents deals with the “control” of the project after it has begun. This involves processes that need to be in place to ensure that the project progresses according to plan. During tracking, monitoring, and reviewing, the project team collects data to assess the current state of the project. These activities always include:

- Review the completed activities and compare to plan
- Identify milestones reached and compare to plan
- Identify deliverables completed compared to plan
- Identify problems or issues

Project control activities, which may be needed include:

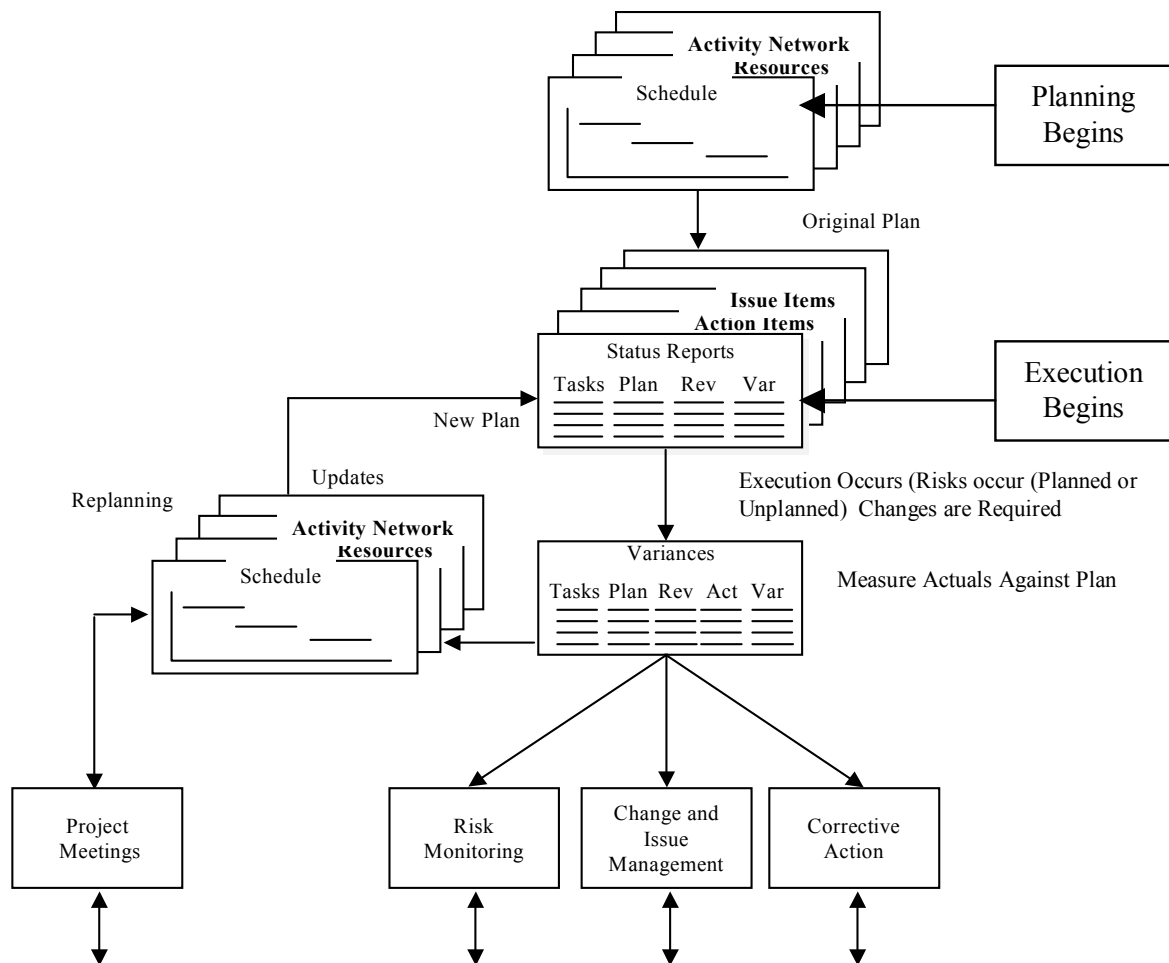
- Addressing issues
- Reviewing change requests and making recommendations
- Preparing action plans
- Rescheduling
- Reallocating resources
- Adding resources and/or equipment.
- Updating project schedule and progress information
- Updating budget and variances

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## Introduction

The next figure presents a graphic view of the project control process.

### Project Control Process



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## Introduction

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### ***Preventing Problems is Better than Fixing Them***

One reason projects fail is due to inattention to basic control principles. Too many times the project team is busy getting on with “completing the project” and not spending the time and energy anticipating problems. Then, once a problem is suspected, the team acts too slowly to resolve the root of the problem.

Preventing problems is far easier and less costly than solving them and the best way to locate a problem is to always be looking for it. Listed below are some major control issues in order of potential impact to the project:

1. Poor time and cost estimates
2. Frequent and uncontrolled changes to the baselined requirements
3. Difficulties in concluding the project because of lack of well-defined completion criteria
4. Frequent replacement of personnel
5. Inadequate tracking and directing of project activities.

Once a project has started, one of the most common problems is that the project manager, and possibly the full project team, is unaware of the existence of a major problem at a stage when it could be contained and corrected. This can be improved by the consistent sharing of information and taking action based on that information.

# Project Execution - PM Elements

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## Approval Process

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### ***What is the Approval Process?***

Project Quality Control management ensures that there is adequate review of project deliverables. Approval is a formalized process ensuring that the appropriate levels of testing and review have been completed.

The process of ensuring that appropriate approvals are obtained is part of the management function and is not strictly a technical function.

The approval process ensures that each project or projects and associated deliverables are successfully completed before beginning subsequent phases. Management gets a comprehensive view of the current project status. Information necessary to ensure that deliverables satisfy the specific business needs of the state organization is also received. Project approval also allows management to reassess the direction of the project, as necessary, and to provide project planning updates, as required.

There are typically three types of approval processes. Approvals discussed in this section occur during the execution stage and include:

- Project Plan and Plan Changes, at the beginning and before changes are made to the baseline
- Phase or Project Reviews, at the end of each phase or project
- Deliverable Reviews, as they are completed and at the end of the project.

The later two approval processes are shown in the figures following this page.

### ***Contractor Payments***

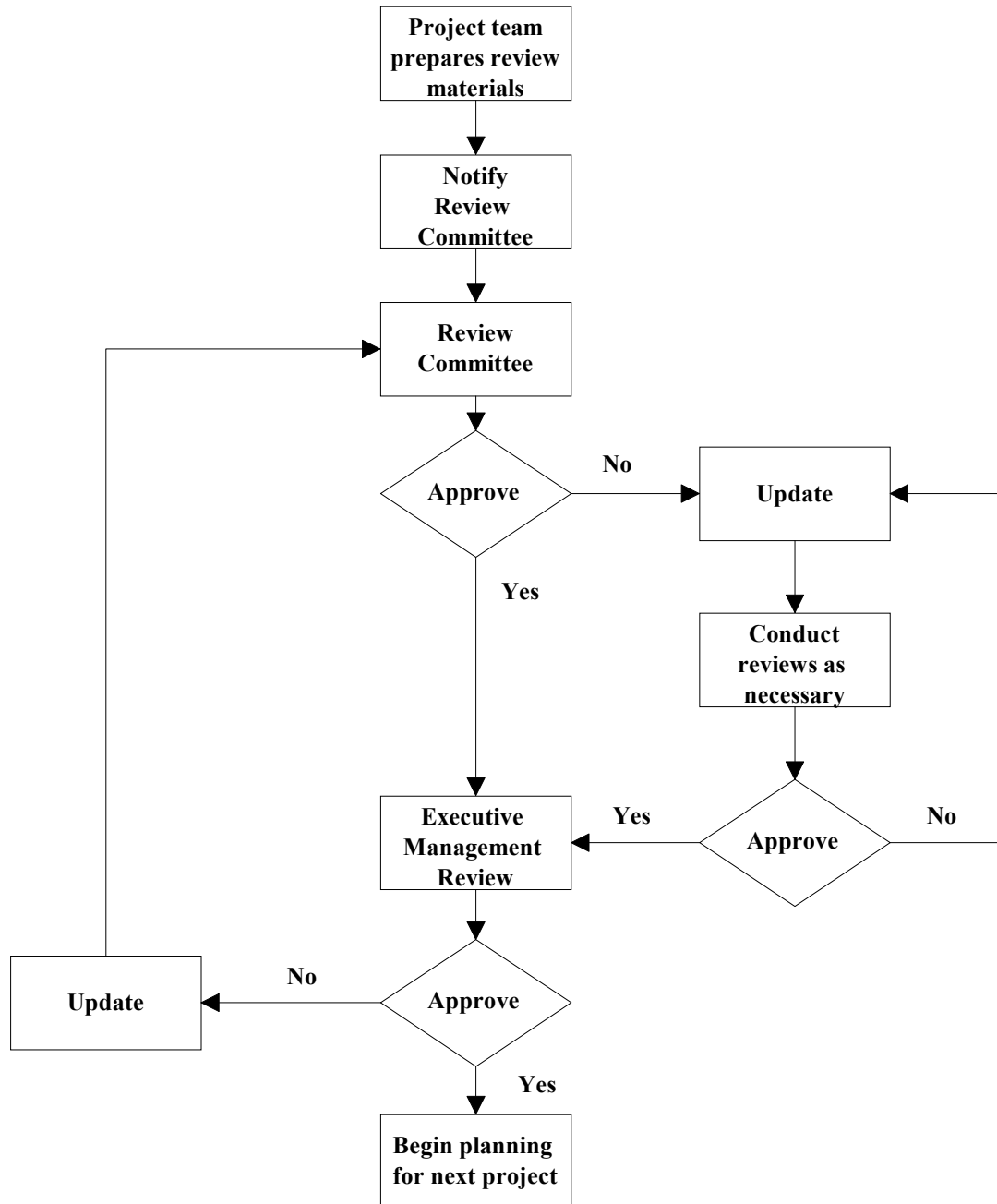
The approval process normally triggers contractor payments. Many IT projects are designed for payment to contractors based on prearranged and negotiated deliverables. The overall contract should be capped. The cap is a dollar amount not to be exceeded for the overall project.

In the case of custom system development projects, a portion of the project budget should be reserved for payments based on integration testing of subsystems as well as full integration testing of the entire system. It is important that contractors receive a revenue stream as the project goes along. However, the revenue stream should be designed in such a way that final payments are not made until after integration testing and deliverables are completed and signed off by the project manager, key users and the Steering Committee.

# Project Execution - PM Elements

## Approval Process

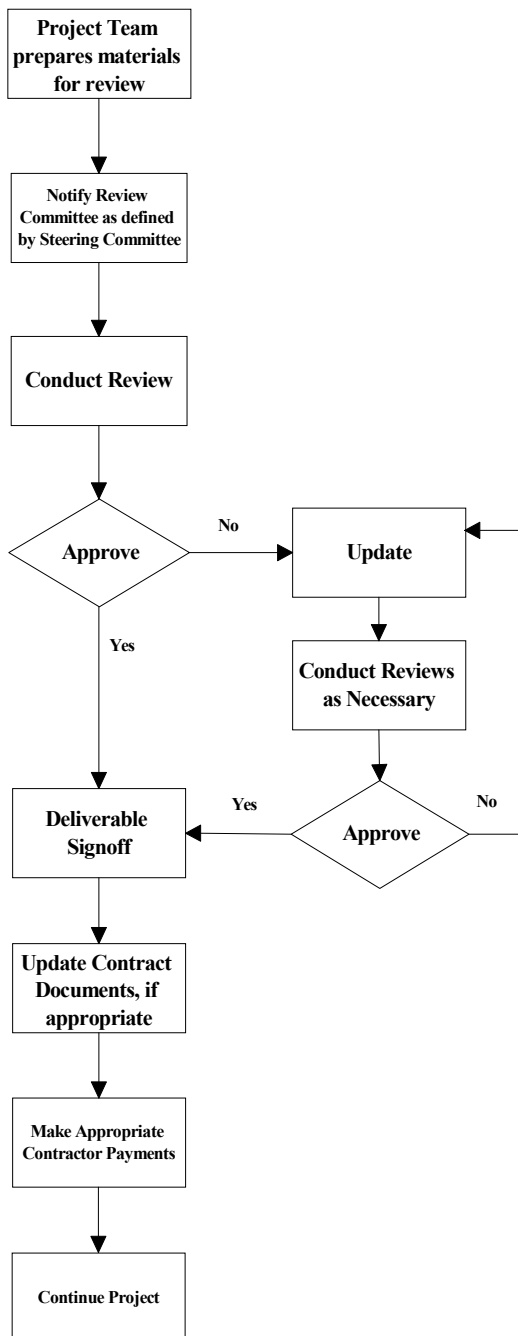
### Sample Project Approval Process



# Project Execution - PM Elements

## Approval Process

### Sample Deliverables Approval Process



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## Approval Process

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The approval process takes place on two levels. First, the technical teams agree that a phase or project has been completed, and then a phase or project completion meeting is held to formalize the event and move on to the next phase or project.

Documentation approval can also be formalized, but on a more limited scale, possibly among sub-sets of the project team.

The figure below provides a sample of how one project summarized the deliverable approval process information.

### Deliverable Sign-Off Matrix

Document Name	To Be Approved by
Project Plan	Steering Committee
Hardware Procurement & Install Plan	Steering Comm./Imp. Team
Site Prep. and Facilities Plan	Steering Comm./Imp. Team
Network Plan	Steering Comm./Imp. Team
Test Plans	Imp team/stakeholders
Quality Plan	Steering Comm./Imp. Team
Data Plan	Imp. Team/stakeholders
Training Plan	Imp. Team/stakeholders
Contingency Plan	Imp. Team/stakeholders
Pilot Implementation Plan	Steering Committee/Imp team/stakeholders
Roll out and Cutover Plan	Implementation Team
Maintenance Plan	Steering Comm./Imp. Team
Support Service Plan	Steering Comm./Imp. Team
Turnover Plan	Steering Committee
Warranty Plan	Implementation Team
Backup and Recovery Plan	Steering Comm./stakeholders
Gap Analysis Report	Steering Committee
Implementation Recommendation Report	Imp. Team
Re-engineered Process flows	Stakeholders/Exec Mgmt
Detailed Requirements	Imp. Team/stakeholders
Detailed Design	Imp. Team/stakeholders
Interface Design Document	Implementation Team
Training Curriculum	Imp. Team/stakeholders
Certifications	Imp. Team/stakeholders/Steering Committee



# Project Execution - PM Elements

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## Configuration Management: Change, Version and Issue Management

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### ***What Happens During Project Execution?***

There are three processes that will significantly increase the chances of project success and will help with the overall management of the project. These processes are collectively referred to as Configuration Management and include:

- Change Management
- Issue Management
- Version Management

During project planning, the management approach for these areas is identified. At start-up, responsibility for these areas should be assigned. At the start of project Execution, these processes should be in place and working. In many regards, the processes are similar and the purposes are the same -- to help achieve control of the project. At times, a requester may not be sure if an item is a change or an issue. In fact, many times an item will start in the issue process and end up in the change process.

The difference between an issue and a change rests in how a project is impacted. Change, as indicated in its name, affects the view of the project and will impact the scope, project definition, and/or specification.

Issues may not have an impact on the defined project's product -- scope, definition, or specification. Issues are identified in the form of questions, problems, or suggestions raised by the project team, management, or contractor. They can often affect the status of tasks or deliverables, which would result in changes to cost and schedule.

Version management or version control is important to ensure a quality product, to minimize errors and to minimize duplication of effort. Version control is a process used to control the release and installation of versions of developed software, purchased software, test systems or potentially any deliverable produced by the deliverable, development or installation team. It is similar to change and issue management because it requires the same level of effort and focus. A project without good version control system is at high risk of not accomplishing the project charter.

### ***You Can't Manage What You Don't Control***

As discussed earlier, too much change in a project is one of the major reasons projects fail. This is the area in which project managers continually lose control. The reason is a lack of discipline within the project team and with the customer to resist "changing" the stated product of the project. A solution is to establish a critical baseline of the project's products and to document it. These documents are the project plan, the product specification, and other development documents that are placed under Configuration Management. Whenever a question is raised, the baseline documents are always the reference point. Anything that alters the baseline is a change.

If an individual is not sure if it is a change, then treat it as an issue.

Part of controlling a project is to have established change and management processes that are unique to the project. These processes are established as part of the project plan and kept current until the project close-out.

# Project Execution - PM Elements

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## Configuration Management: Change, Version and Issue Management

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The key elements to these processes are:

- A central repository for change, issue, and version information
- Summary of information for the processes on either a change request form or issue form (as shown and discussed later in this section).
- Robust Configuration Management processes
- Assignment of a Change Manager and Change Control Board (CCB).
- The Change Manager should be either the project manager or a member of the status tracking/review team. If the project manager is not the Change Manager, then he/she is at least a member of the Change Control Board.
- The Change Control Board should consist of the Change Manager, key technical and management staff from the project team, representation from executive management, stakeholders, and user communities. The size of the Board should be kept to a working group of not more than 10 individuals.
- Assignment of an Issue Manager. Typically this is someone in the administrative project area who will work with the Project Manager and can prepare the material for the project status meetings. In a small project, it may be the Project Manager.
- Inclusion of change and issue summary information as part of the standard project status meetings.
- Consistent and ongoing evaluation of change and issue items and development of appropriate resolution/implementation strategies.

Change Management is a process that provides a mechanism to identify and handle change. It is a part of Configuration Management.

To maintain the balance between requirements and the schedule, the project team should use a Change Management Process. This process allows for change during the project's life cycle but always puts the change in the context of the latest version of the approved project plan. This version is called the current baseline.

The Change Management Process consists of a series of steps that allows changes to be identified, evaluated, priced, and tracked through closure. If the change is significant, you should perform a Cost Schedule Impact Analysis (CSIA). A CSIA is a detailed analysis of what the change might cost and, if implemented, what impact it might have on the project schedule. This analysis is performed under the direction of the Project Change Manager and approved by the Change Control Board (CCB) and the Steering Committee.

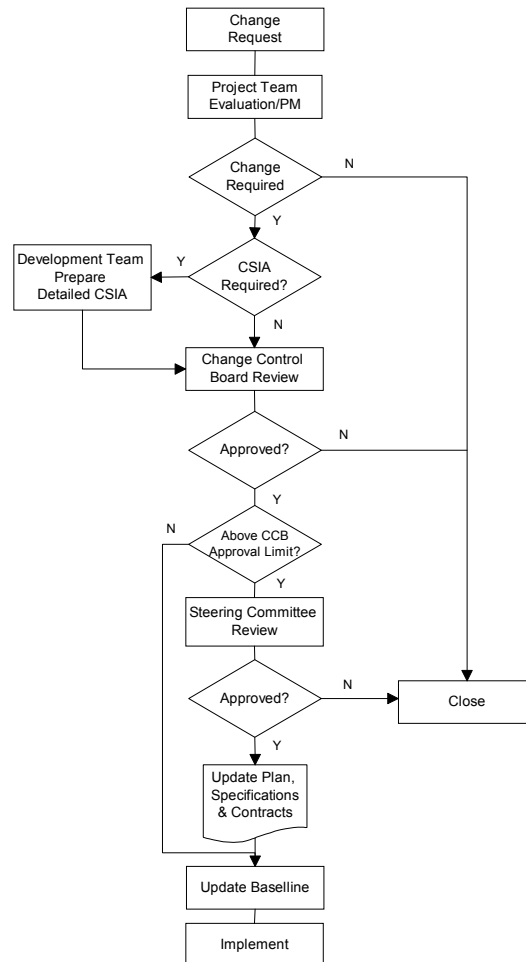
The following process may be too complex for some projects and not complex enough for others. The goal is for projects to implement and use a process that fits the project.

The following figure portrays an overall flow of a change request within a configuration management framework. In the figure, CSIA refers to Cost/Schedule Impact Analysis. See Section 5, Change and Issue Management, for a more information on this process.

# Project Execution - PM Elements

## Configuration Management: Change, Version and Issue Management

### Control Item Flow within a Project



### ***The Change Control Form***

Stakeholders should submit a document change request on any change to be considered.

The Change Control form shown in this framework is included in Appendix B: Forms.

The form is additive. In other words, additional information is completed on the form as it moves through the process. This process is iterative in that it will keep occurring until the project is complete.

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## Configuration Management: Change, Version and Issue Management

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### ***Phase 1 - Requester Information***

The Change Control form, found in Appendix B: Forms, includes the following:

**Identification Block** - Is completed by the requester and identifies the change request title, which will be used in subsequent communication, the date submitted, and the person and organization submitting the request.

**Proposed Change Description and References** - Describes the change being proposed and clearly identifies whether the change is system, organizational, or procedural in nature. Any reference material that will assist the reviewers should be identified and attached.

**Justification** - A discussion of why the change is being proposed, including a cost benefit analysis, if appropriate. In other words, how will the customer and organization benefit from the change?

**Impact Statement** - If the change is not implemented, how will it adversely affect the customer and organization?

**Alternatives** - List at least one alternative (more if possible) to the change you are proposing, and briefly indicate why the proposed change is better.

Attach any supporting documentation that helps clarify the proposed change.

When complete, submit to the Project Change Manager. At that time, a control number will be assigned so it can be tracked to resolution.

### ***Phase 2 - Initial Review of the Change Request***

All change requests will be reviewed on a regular basis by the project Change Control Board. This Board will typically meet on a weekly, bi-weekly, or monthly basis. The actual schedule will depend on where the project team is in terms of the project life cycle. During phases that typically have a high volume of change, the Board might meet weekly. During other phases, the Board might meet once a month. The Change Manager will drive the schedule based on the number and complexity of change requests.

As part of Phase 2 of the Change Control Process, the Board will complete the second part of the form, which includes:

**Initial review results and disposition** - The Change Control Board will review the initial request and determine whether to proceed, reject, or defer the request. In moving forward, the request may be assigned to an analyst for further analysis.

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## Configuration Management: Change, Version and Issue Management

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### ***Phase 3: Initial Impact Analysis***

The assigned analyst will make an initial assessment of the cost, schedule, and resources needed to implement the proposed change. If the requested change is complex, and an initial assessment cannot be made quickly, a Cost/Schedule Impact Analysis (CSIA) should be requested.

The analyst will indicate this and will estimate the cost, schedule, and resources needed to perform the CSIA.

The Change Control Board will once again review the requested change and either accept, reject, or defer the change.

### ***Phase 4: Final Review Results and Change Priority***

When the analysis has been completed by the assigned analyst, and the cost, schedule, and resource needs are identified, the management team will submit the change to the Steering Committee for review.

If approved, the appropriate processes will be followed to update contracts and the baseline documents.

## ***What is Issue Management?***

Issue management is a process that provides a mechanism to process and review issues. Issues that develop during the project need a way to be raised by the project team and for the team to know that they will be addressed.

When issues arise, they need to be resolved in a consistent and disciplined manner in order to maintain the quality of the deliverable, as well as to control schedules and cost. The Issue Resolution Process ensures that the differences, questions, and unplanned requests are defined properly, escalated for management attention, and resolved quickly and efficiently.

The Issue Management Process should handle technical problems or issues, as well as process, organizational, and operational issues. The process considers:

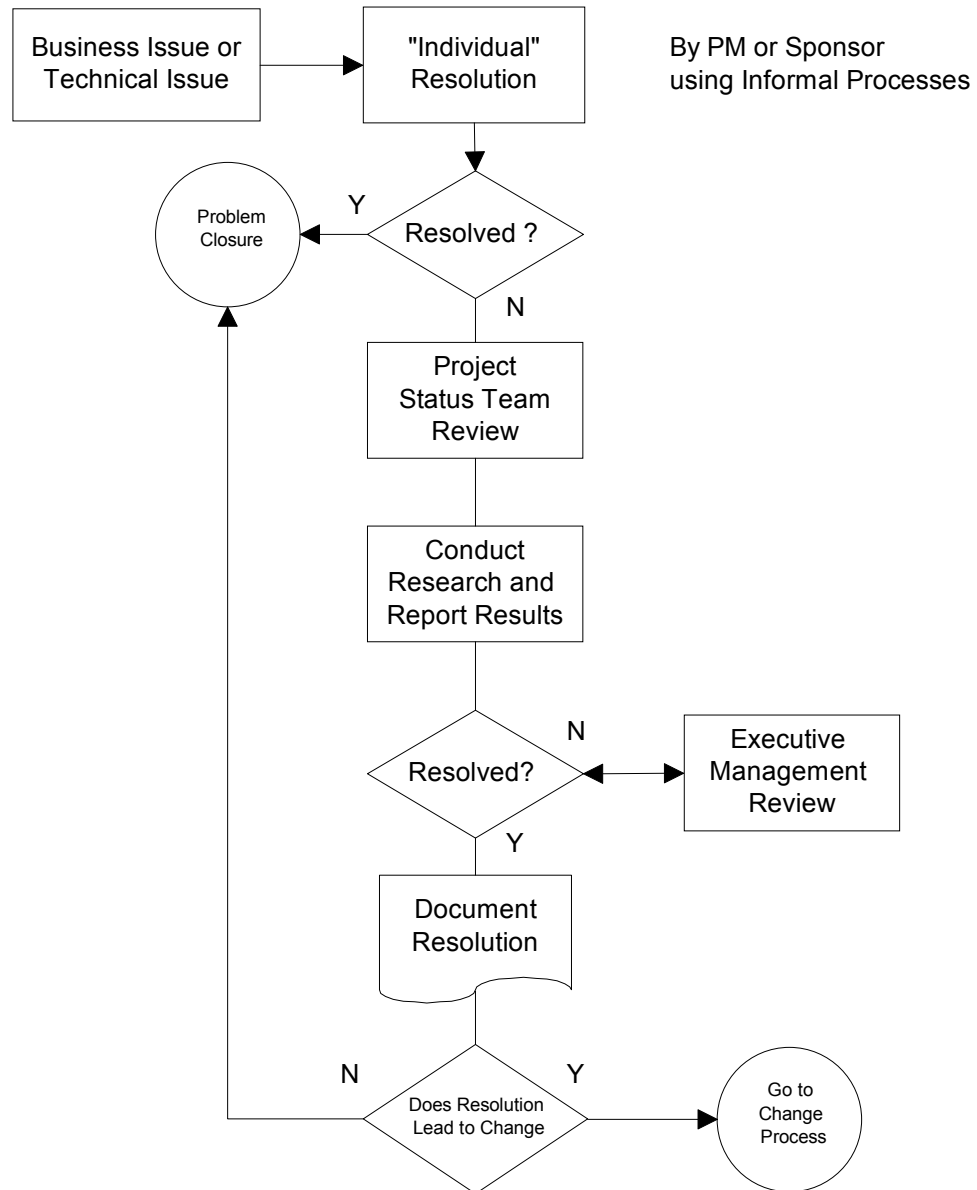
- Appropriate procedures for issue escalation
- Level of management that needs to be involved for escalation
- Required time for resolution
- Responsibility for researching or resolving the issue

The following chart is a generic process for submitting, reviewing, and gaining closure on an issue within a project. This is a process that may be too complex for some projects and not complex enough for others. The goal is for projects to implement and use a process that fits the project.

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## Configuration Management: Change, Version and Issue Management

### Issue Control Process



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## Configuration Management: Change, Version and Issue Management

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### ***The Issue Resolution Form***

The Issue Resolution Form gives everyone involved with the project a way to report issues or problems. It provides a template for documenting the issue, assessing the impact of the issue, making recommendations, determining the cost (people and assets), and time required to resolve the issue, if it becomes a change.

This process is also iterative in that it will keep occurring until the issue is closed or the project is complete.

### ***Phase 1 - Requester Information***

The Issue Resolution Form is included in Appendix B: Forms.

The Issue Resolution Form is divided into major categories. The first part is completed by the person reporting the issue. Its major categories include:

**Identification block** - Identifies the issue title, which will be used in subsequent communication, the date submitted, and the person and organization submitting the issue.

#### **Issue classification and description -**

- Description of issue
- Recommendations, if any
- Impact (if not resolved)
- Date Required and Proposed Assignee

Each category should be self-explanatory, but individuals should be directed to the issue manager for assistance as needed. Attach any supporting documentation that helps clarify the problem or issue, such as report outputs, user screens being used, steps performed leading to the problem, error messages, etc. When complete, submit to the Issue Manager. At that time, a control number will be assigned so that the issue can be tracked to completion.

### ***Phase 2 - Initial Review of the Issue***

All issues will be reviewed on a regular basis by the project status group at the project team status meetings.

As part of Phase 2 of the Issue Resolution Process, the group will complete the second part of the form, which includes:

- Reviewer information and initial comments
- Estimate of additional effort (CSIA prepared if further evaluation required), if appropriate

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## Configuration Management: Change, Version and Issue Management

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- If the issue becomes a change, responsible person and planned completion date
- Signatures

### ***Phase 3: Tracking***

All items will be tracked until they are resolved either by closure or by moving to the change control process. The Issue Manager will report on all open issues at the status meetings. If the list of issues is too long, only the new or key issues should be discussed. At times, it may be advisable to pre-distribute issue information so that the group can review the material before the meeting. Major issues and their resolution should always be reported to the Steering Committee.

### ***Phase 4: Final Review Results and Change Priority***

When the issue or problem has been resolved and verified, the actual date the problem was resolved and an approval signature completes the issue resolution process, and the issue is closed.

If the issue does become a change, the configuration management process is to transfer the issue to the change control process and track it as a change.



# Project Execution - PM Elements

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## Corrective Actions

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### ***The Best of Plans can go Wrong***

When a project encounters problems, the actual problem needs to be sized and decisions made on corrective actions. If the project is off track or over budget, steps should be taken to determine the following:

- Is the project still meeting its original objectives?
- Are the issues so great that the project must be replanned?
- Can the project meet the documented organization's business needs?

The corrective action process can go hand-in-hand with the change control process; however, the change control process is not intended to solve problems that need to be addressed in an urgent manner or where there is a question on the soundness of the project.

Generally, problems that fall into the category of needing corrective action require quick action by the project management team and the Steering Committee.

### ***Where Problems Come From***

Situations that normally require corrective actions fall into the following categories:

#### **Internal Examples**

- A particular task is behind schedule, over budget or it was missed and it impacts the overall project plan
- A major milestone is missed
- The functionality of the project deliverables do not meet objectives.

#### **External Examples**

- A major technical problem with the selected technology may have surfaced, and the resolution to the problem does not allow the project to be developed as specified.
- The organization environment has changed, and the current IT project is not part of the solution for meeting their business needs.
- Regulatory changes have occurred
- Funding has been withdrawn or modified

# Project Execution - PM Elements

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## Corrective Actions

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All of the internal situations identified above represent increasing severity for the project team and span a wide range of decision making processes, from simple additional attention at the status meeting to developing complete and detailed corrective plans, to stopping work orders. Each of these situations means that the project is falling further behind schedule and over budget.

A key part of project management is providing quick action to identified problems and developing successful corrective plans. Corrective action plans can take the form of replanning, reallocating resources, or changing the way the project is managed and organized.

Corrective action that was planned as a result of risk planning is referred to as contingency actions. Corrective action that was unplanned is referred to as a work around.

The corrective actions available to the project manager center on cost, schedule, and technical performance parameters of the project. However, stakeholders and executive managers should also be involved at an early point in the process. They have the ability to impact the corrective action process by shifting business priorities, reaffirming their support for the project, and showing commitment to having it replanned. If they are not brought in early, that support becomes harder to obtain.

### ***Fix the Problem with a Recovery Plan***

An effective control process doesn't just track, monitor, and review, but also re-directs the project if a major problem occurs. The first rule is to try and protect the overall integrity of the project charter and the project schedule.

The goals of the recovery plan are to:

- Fix the problem quickly
- Limit the damage.

Detailed recovery plans should be put in place if a problem could cause harm to some aspect of the project. The plan should:

- Identify the owner of the recovery plan
- Identify the sequence of activities that must occur to complete the resolution
- Determine the dates when each activity of the plan will be started and completed, and identify the dependencies of each activity
- Ensure that the appropriate people approve the plan
- Reflect the outcome, if the recovery plan is successful, in terms of schedule, activities modification, and cost.

All recovery plans should be tracked following the exception reporting requirement covered in the *Tracking and Monitoring Project Performance* section of this manual.

# Project Execution - PM Elements

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## Project Reviewing

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### ***Review Process***

Just as tracking and monitoring are critical to controlling a project, so too is reviewing. One of the major causes of a project getting off track is the lack of attention to:

- Formal and consistent project reviews
- Setting up and using informal assessment methods.

The focus of project reviews is to ensure that information is being shared communicated and evaluated. Where tracking and monitoring focused on the process of measuring actual project performance to the baseline, reviewing focuses on sharing that data and other related information with the project team and stakeholders throughout the project.

As in all other areas of project management, the review process needs to be tailored to the specific project. However, there are some minimum activities that should be performed, such as:

- and detailed design reviews, possible design walkthroughs, and peer reviews.
- Steering Team Status Meetings should be held and attended by project team members responsible for key project organization and deliverables at least every other week.
- Executive Reviews - as needed.
- Independent Reviews - as needed; will depend on the size of the project and the risk. However, each organization is encouraged to develop its own schedules and standards for quality reviews.
- Technical Reviews - are driven by the life cycle being used and the particular stage of the project. For example, during system design, the reviews are concerned with the stage of the design Committee meetings should be conducted at least once a month.

### ***Informal Review Process***

The informal reviews are the processes that the project manager and key project staff set up to measure the “atmosphere” of the project.

This information can be gathered by:

- Walking the halls
- Visiting team work areas
- Sitting in on some team status meetings
- Inviting a key developer for coffee.

The purpose is to get input from all parties on issues beyond what is presented in the formal reviews. Having a set, consistent format limits the open exchange of information. For example, by talking with one team member, it might be discovered that a key technical staff member is very unhappy about some decisions on the project. This unhappiness might escalate to the point where a person would leave the project, and/or it could develop into a major problem.

# Project Execution - PM Elements

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## Project Reviewing

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Part of the project manager's strategy includes collecting information and interjecting it into the formal processes, where it can then be analyzed to determine if actions are required.

Lastly, the way a project is organized will drive the way the project is reviewed. Each key project activity needs to be tracked and reviewed as such, and the person or group responsible for the activities will need to provide input to the control process.

### ***The Status Review***

The cornerstone of the project review process is the project status meeting with the Steering Committee. The project team should know that this meeting is not optional. For this reason, it is recommended that status meetings occur regularly and consistently throughout the project life cycle. Meeting too often is disruptive and does not allow the project team to focus on other tasks. Not meeting enough will allow issues to go unresolved.

Some projects set up the project status meeting on the same day, at the same time, and at the same place. Another hint is that the meeting time should be on Tuesday, Wednesday or Thursday to avoid Mondays and Fridays, since these days are frequently taken off and generally produce rescheduling issues.

This way, participants can set their schedule and the schedule forces a routine to be established. Consistent meetings also drive a discipline into the project organization.

The purpose of the Project Status Meeting is to coordinate the schedule, resource, and financial needs of the project. The objective will be to share and receive data, and to make group decisions critical to the project plan. Areas of prime interest are the financial, schedule, and technical issues of each group and how they work together within the overall project structure.

### ***Team Meetings***

The first project team meeting serves as a training session for the participants. The training session covers how future meetings will be conducted and what each participant's roles and responsibilities will be during and after the meeting. Each member should have at least one or two backups who should attend the first meeting.

Preparation for this meeting is critical and should map to the status report generation that will be discussed in the Tracking and Monitoring Project Activity section.

The following topics should be covered in the first meeting:

- How are risks to be managed and reported on?
- How will changes and issues be tracked and reviewed?
- Who will keep the schedule and cost information, and how will it be updated for review?
- What are key lessons learned from other projects?

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## Project Reviewing

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- What is the baseline plan?

After the initial orientation meetings, attendees should be specifically selected and the numbers limited. They should consist of individuals who can provide status information and contribute to issues, risks, and general status discussions.

As a guideline, if the project team is small, then the full project team may attend. If the project team numbers 10 to 24, then only lead team members (planning, development, test, quality, etc.) should attend. For projects larger than 25 members, attendees should be the team leaders.

The bottom line is that the persons attending the meeting communicate the status of the project activities and action items for their assigned area of responsibility. However, the number of attendees should be controlled so that the group is not too large to be productive.

A location should be selected that will provide the fewest disruptions. It should not be in someone's office, or in a public area. A private conference room where telephones can be controlled is a good location.

Disruptions cause the meeting to appear disorganized and cause the length to extend. This results in people not wanting to attend because it is viewed as a waste of time.

All meetings should have an agenda. A good sample agenda is provided on the next page.

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## Project Reviewing

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### Meeting Agenda Project X

<b>Meeting Date:</b> April 10, 20XX (Tuesday)		<b>Meeting Time:</b> 2:00 pm to 5:00 pm Total Time Approximately 3 hours
<b>Meeting Location:</b> Main Conference Room		<b>Attachments:</b> None
<b>Leader:</b> L. White (Project Manager) Bud Smith (Alternative)		<b>Note Taker:</b> R. Green Laurie Davis (as needed)
<b>Attendees:</b> C. Cooke L. White B. Davison R. Wise M. Strawn	R. Chapman T. Elsmore R. Tom J. Bicknas G. Kennon	<b>Please Bring or Prepare:</b> · All outstanding project issues and change requests · Any written documentation pertaining to activity deviations or new risk elements. · Standard project status report and attachments.

#### Goals of Meeting:

- 1) Review Project Status
- 2) Resolve open change request
- 3) Understand new Federal issues

Agenda Item	To Be Accomplished	Person Responsible	Time Allotted
Project overview for reporting period	Inform & Discuss	L. White	15 Min.
Schedule overview	Inform & Discuss	T. Elsmore	5 Min.
Financial overview	Inform & Discuss	J. Bicknas	5 Min.
Technical overview	Inform & Discuss	G. Kennon	10 Min.
Documentation Team Report	Inform & Discuss	R. Tom	10 Min.
Break			10 Min.
Change Management update	Update	T. Elsmore	10 Min.
Issue list review	Update	J. Bicknas	10 Min.
Risk Management update	Update	G. Kennon	10 Min.
New Federal Requirements Issue	Inform & Discuss	L. White	10 Min.
Review of action items	Review	R. Green	5 minutes
Close Meeting	Review	L. White	5 minutes

# Project Execution - PM Elements

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## Project Reviewing

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Since a large percentage of project time is spent in meetings of one form or another, a set of rules should be applied to each meeting type. These rules follow standard meeting management principles:

- Start and end on time
- Come prepared
- Bring handouts; information should not just be in the attendee's head.
- Summarize information; do not read it.

A list of action items and resolutions should be the by-products from the meeting. The action items and discussion topics should be written up and disseminated. If a project action item, change issue, or new risk element is mentioned, then the support person responsible for distributing the status meeting information should ensure that the responsible project team member is informed.

Since a project manager is responsible for reporting on the project's status to other levels of the organization, written materials are needed to complete the necessary reports.

If significant tasks are not on schedule, then the responsible person should address:

- Why the task completion is late or early
- What other areas might become impacted
- What actions need to be taken, if any.

### ***Executive Meeting***

If appropriate, a monthly or quarterly executive meeting with executives who are not on the Steering Committee should be held to facilitate open communications. The timing of this meeting should be built into the Project Plan.

### ***Link to Change, Issue and Quality Management***

As key components of the project control process, the reviewing cycle and structure are closely linked to the other control processes. The direct link to tracking and monitoring has already been discussed. However, there is also a link to the project's change and issue management and quality processes.

The formal review process is the main channel for the exchange and recording of project communications. For this reason, it is important to realize that during the planning of each type of review meeting, some element of quality or change management should be included.

# Project Execution - PM Elements

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## Risk Monitoring and Mitigation

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### ***Preventing Problems***

Risk identification, monitoring and resolution are key tools to successfully completing a project. Part of controlling a project during the execution phase is to have an established risk management process that is unique to the project. This process is begun as part of project planning and is kept current until the project close-out. The key elements to this process are:

- Creating a central repository for risk information and associated documentation of risk items and resolution strategies
- Summarizing information on a Risk Analysis Worksheet
- Assigning a Risk Manager, which should be either the project manager or a member of the status tracking/reviewing team (this assignment should have been done at project baseline, but definitely by the early days of Execution)
- Including a risk summary in the regular status meetings
- Providing a consistent and ongoing evaluation of risk items and development of risk strategies:
  - ⇒ Identify the risk
  - ⇒ Evaluate the risk and assess its potential impact
  - ⇒ Define a resolution strategy.

### ***What is after Risk Assessment?***

The risk control process is started at project planning, is baselined at project startup, and is fully maintained during project Execution. The key is not the format of the data, but that a plan is kept current during the execution phase.

Remember, risks are not events that have occurred, but rather events that might occur that would adversely impact the project. Events that have occurred and are impacting the project are addressed in the Change Management, Issue Management or Exception Reporting Process.

### ***The Evolution of Risk Control***

As the project evolves through the project life cycle, the ability to define and specify the risk items increases. This is attributable to the fact that more is known about the project and the associated issues.

During the execution phase, risks are more definitive and tangible resolution strategies emerge. This allows for the development of realistic contingency plans, including specific action plans. These actions are then tracked. The actual format for the risk management plan may need to reflect these activities.



# Project Execution - PM Elements

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## Risk Monitoring and Mitigation

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### ***Risk Monitoring is an Iterative Process***

In all cases, risk analysis is an iterative process that is performed throughout the project. Risk analysis examines the risk and its potential impact on the project and defines actions to eliminate or to mitigate the impact of that risk, should it occur.

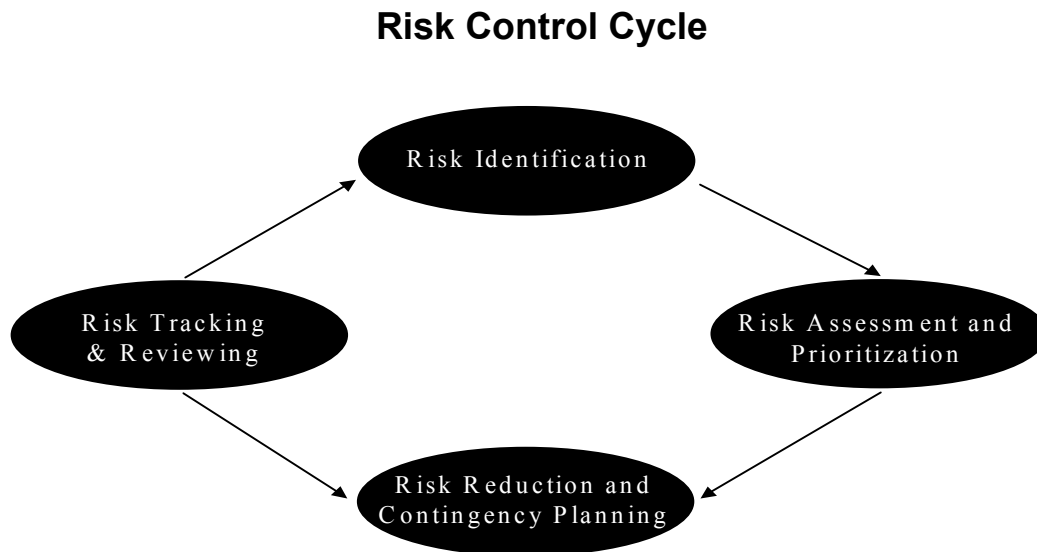
The process starts with the risks identified in the project plan and the first definition of resolution strategies. There are typically three types of resolution strategies: eliminating, reducing or accepting.

The risk management process, as defined in Section 3, includes four overlapping steps:

- Risk identification
- Risk assessment and prioritization
- Risk reduction and contingency planning
- Risk tracking and reviewing

The balance of this section further addresses these issues of the risk cycle and risk resolution.

The risk control cycle is shown below.



### ***Risk Manager***

Risk control role is assigned in the planning phase and is documented in the Project Plan as the Risk Manager. The Risk Manager is responsible for ensuring that risk management is performed throughout the project. This person may be the project manager, although in most large projects this is not the most advisable approach. It is primarily a workload issue. In execution, risk management may require a separate full- or part-time position to sufficiently handle the workload.

# Project Execution - PM Elements

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## Risk Monitoring and Mitigation

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This person should:

- Be senior enough in the project organization structure that they would have the ability to request that specific risk contingency plans be assigned and staffed
- Attend the project team status meetings
- Have an understanding of the overall project.

The identity of the risk manager should be publicly announced and should also be reflected in the project organizational chart. In most cases, the risk manager will also be fulfilling another management or technical role on the project team. The notation can be in the form of an asterisk or sub-heading. A risk management box may be assigned, and names will be repeated for different functions.

See Section 3 for an example of a project team organization chart.

### ***Risk Meetings***

Risk management, of which risk control is part, is a process that involves all members of the project team and occurs throughout the project life cycle. Risk meetings contribute to the process of identifying risks and developing ways to approach the risks.

- **Risk Identification Meetings.** It is during this process that the current risk list is reviewed and updated.
- **Steering Committee Meetings.** A Risk Identification Summary of the top risk items for the project should be included in the executive project status meeting. Ideally, this should be not more than one page. It should list the risk, state the recommended resolution, and indicate the current status.
- **Project Team Status Meetings.** The individual responsible for risk should report to the project status group on the current status of project risks. There should be a written summary, preferably using the actual risk form, including information on all contingency plans currently underway.

### ***Ongoing Risk Identification***

The initial list of risks from the Planning Process will evolve over time. To ensure that new risks are added and resolved risks are eliminated, risk identification meetings should be held. How often this should occur is based on the size of the project and the perception of the project team and key stakeholders as to the degree of risk that exists for the project. For most projects, monthly risk identification meetings are adequate.

The format for these meetings should be open and interactive to facilitate a wide consideration of risk areas. The starting point for this meeting is the previous risk list. The group should be given some ground rules in terms of the degree of risks that will be tracked and ways to eliminate or include risk items.

# Project Execution - PM Elements

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## Risk Monitoring and Mitigation

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Current problems are not to be considered, as these are issues for other processes. The meeting will require a facilitator and note taker.

This group assists in the process of prioritizing the risks by determining the probability of their occurrence and the impact the risk could have on the project. Specific procedures for risk management are defined by the specific project manager and team.

### ***Focus on Key Risks***

Risks must be prioritized to ensure that the key risks are addressed. Be careful not to identify so many minor risks that major risks are buried. The basic ground rules for prioritization are:

- There should generally be about 5 to 10 risks being “worked” at any one time. These should be the risks with the highest probability of occurring. However, very large projects, each subsystem or major activity may be tracking this number of risk items.
- The list of actively monitored risks should generally be no longer than a single sheet. Keep a separate list of lower priority risks so that they can be reviewed at future risk identification meetings.
- Focus on the risk items that have the greatest possible impact on cost and/or schedule.
- The prioritization process starts with the group that identified the risk, but also includes the project manager, related stakeholders, and management.

It is impossible to give a hard-and-fast rule on what method should be used for prioritization, since this is a process that needs to be driven by the actual project. As the project team works with risk management, they will get more proficient at knowing what should be considered as the top risk, which ones need the most attention, and at what time.

#### **EXAMPLE:**

For a large database system development project, one risk item is that “the software maintenance staff have not been trained on the database that is being used to develop a major new system.”

This risk item has been ranked high because of the probability of its occurring and the cost to the project if the risk occurs. All agree that this is an item that must be addressed.

The current project is in the design phase and has an anticipated schedule of nine months.

For a project with few other risks, a contingency plan may be set up whereby the software maintenance staff receive training and participate in development to achieve technology transfer. In another project with numerous high risk items, this risk item may be moved off the top risk list because there are at least 15 other risk items that, if they occur, will ensure that the project will not make it to maintenance at all.

The conclusion is that, even though risk prioritization and evaluation methodologies are mathematically based, this process is still based on judgment.

# Project Execution - PM Elements

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## Risk Monitoring and Mitigation

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### ***Risk Resolution***

For the “top risk” items, mitigation/resolution strategies must be developed. From the steps above, a view of the risk is developed that includes: where, when, and to what extent the risk will impact the project.

With these factors identified, the following options can be considered:

- ***Eliminating*** or avoiding the specific threat, usually by eliminating the cause. The project team can never eliminate all risk, but specific risk events can often be avoided. Eliminating a risk usually involves taking specific action to change a planned event in the project. That is, if a risk is identified that will occur if the project continues on its current course, the option is to change the course. Risk elimination depends on the extent of change that would be required to the overall project plan, considering the cost to make the change, and the calculated severity of the risk should it occur. As a general rule, elimination should be pursued when the risk cannot be managed away or it will be costly to the project.
- ***Reducing*** the impact to the budget from a risk through mitigation. In some ways it can be seen as “insurance.” The area of reducing risk is the most familiar resolution approach used during the planning process. This is also termed risk mitigation and it involves developing reserves. It is defined as a set aside of project dollars and/or schedule to be used to cover the problems that a risk event would cause. The reserve can also be a calculated figure as was presented on the form in the Risk Plan.
- ***Accepting*** that a risk will occur and developing contingency plans to be executed should the risk event occur? It could also be in the form of increasing the cost of the budget to some threshold for specific risk items. A risk contingency plan can be developed for the project that defines the actions taken, the resource plans, and the factor(s) that trigger an action, should a given risk occur. Contingency plans are pre-defined action steps to be taken if an identified risk event should occur.

### ***Historical Record***

It is always a good idea to maintain a history of the project risks. This information can be used as “lessons learned,” and the project team can benefit from reviewing past risks and occurrences.

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### ***Introduction to Project Tracking and Monitoring***

Once a project has advanced to the phase of execution, the consistent reporting on the true status of the project is essential. During Execution, the project team's and, specifically, the project manager's focus now shifts from planning to tracking and reviewing what was said would be done. This information is generally provided in the Status Report package, which would include at least the following information:

- Status Reports
- Updates to the schedule -- plan versus actual, generally in the form of Gantt or PERT chart
- Financial Analysis, including the comparison of actual costs versus planned costs and variance measurements, i.e. financial metrics
- Exception Report addressing plan variations.

See the section on Status Reporting later in Section 5 for more detail of information to be included in a Status Report package.

### ***The Project Plan as the Road Map***

To begin the tracking process, the project plan is the roadmap. The tracking activities contained in this document serve as the minimum set of planned elements that are to be tracked and monitored over the lifetime of the project. This list should be augmented and tailored for each specific project.

It should be noted that part of the planning was to acknowledge which elements were to be tracked and how often they were to be tracked. Thus, the planning process dovetails with the tracking process to provide a practical, workable method to evaluate where a project stands at a given point in time with regard to the initial baselined plan.

The concept of a perfect plan is an illusion. Plans are living documents that change as the environment of the project changes. In the new world of information technology, success is dependent on strategies, project resources, and people. The focus should be on monitoring and directing these dynamic elements and not on hard-and-fast precepts.

### ***The Project Plan as the Baseline***

The key elements that are needed for tracking include:

- Scope of Work including project objectives and success factors
- Project Functional Specifications or Product Scope description
- Work Breakdown Structure (WBS) -- activity list and activity network
- Work packages
- Budgets and Estimates, along with the assumptions on which they were based
- Master and supporting schedules

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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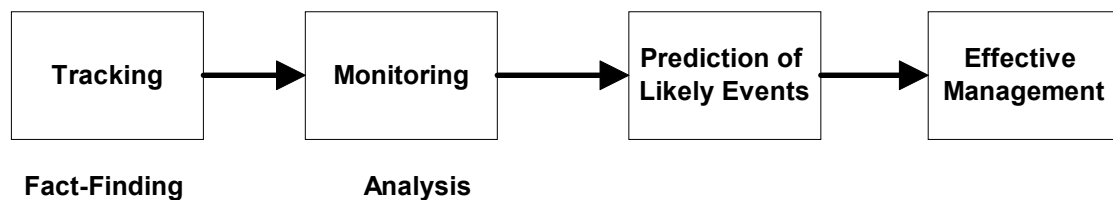
- Financial and funding plans
- Quality and Configuration Management Plans
- Staffing plan
- Spending plan.

Even very large projects can be controlled well if adequate time is spent planning, tracking and monitoring.

### ***Why Tracking and Monitoring?***

The management functions of tracking and monitoring are indispensable to the effective and efficient control of the project. In this methodology, tracking is defined as the fact-finding processes, and monitoring is the analysis of these facts. Both are needed for the management of the project.

Control processes are established not to determine what has happened, but rather to predict and manage what may happen in the future.



Information generated during the tracking and monitoring processes forms the basis for reaching a judgment about the project status and whether corrective action is required. It also allows the project team to answer these specific questions:

#### **General**

- Where is the project on schedule, cost, technical performance, objectives, and goals?
- What is the status of activities that were to be completed?
- How does this status impact future project activities?
- What is going right on the project?
- What is going wrong?
- What opportunities are emerging?
- Are the project stakeholders comfortable with the results of the project?

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### Organization

- Is the project team an effective and suitable organization?
- Does the project manager have adequate control and authority?
- Have key roles been defined in the project?
- Are the project team personnel innovative and creative by suggesting project management improvements?
- Does the project team get together on a regular basis to see how things are progressing?
- Does the project have an efficient method for handling change requests?
- Does the project team seek the advice of stakeholders on matters of mutual concern?

### ***How and What is to be Tracked?***

A key management issue in every project is to develop processes that provide critical information without becoming a burden and taking on a life of their own. Many think this is only an issue in large projects, but small projects share equally in the problem because they typically lack the necessary resources to do many of the management functions.

Just as in the planning process, the project manager walks a fine line to achieve the correct level of detail. As a general rule of thumb, most tracking materials should be by-products of execution of the project. The level of detail about the project should decrease as the information is moved up through the project organization.

For example: A two-page status report from each of the major project teams within the software area should be reduced to a two-page report from the full software area that is given to the project manager. In turn, the project manager takes reports from all the major activity areas and reduces the report down to one Status Report package. This process can be automated through enterprise tools or by simply using word processing and electronic mail. It can even be a manual process.

"How and what is to be tracked" is a very important question and one not to be taken lightly. The project manager should focus on putting in place the most critical parts of tracking and monitoring, and then add additional items to track as necessary, based on the complexity of the project.

Tracking and monitoring means focusing on the following kinds of issues:

- Status – current activities and planned activities.
- Comparing the planned schedule to the actual progress and determining the current position. This analysis may be done at the top levels of the Work Breakdown Schedule for reporting, but may also be done at the actual task level for determining work activities. Key items are:
  - ⇒ Tasks planned and actual start/finish dates.
  - ⇒ Impact of actuals on project plan.

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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- Comparing the planned budget with the actual expenditure. The tracking and monitoring processes should generate:
  - ⇒ Actual expenditures to date.
  - ⇒ Estimate to Complete (ETC).
  - ⇒ Estimated Cost at Completion (EAC).
  - ⇒ Burn Rate (in either hours or dollars).
  - ⇒ Adjusted baseline after replanning, if necessary.
- Technical performance and quality indicators from each developmental stage of the project.

### ***When Should Tracking be Done?***

The frequency of the various tracking and monitoring activities will vary with the specific element and the amount of detail needed and should complement the various reviewing processes of the project.

The frequency of tracking activities should be noted on the master schedule for the project and possibly summarized in a project tracking matrix. A sample matrix for a project is provided below.



# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

### Project Tracking Matrix

Tracking Activity	Recommended Frequency	Possible Automated Tools**	Remarks
Updated Project Milestone Schedule	Status Report Qtrly, Milestone, or Phase Completion Reviews	MS Project Timeline FastTrack	GANTT chart preferred Save copy of previous month's chart
Updated Work Product Identification	Status Report Qtrly, Milestone, or Phase Completion Review As deliverable dates change	Automated project database	Provide updates to database manager
Updated Estimate at Completion (EAC)	Status Reports As required when ahead or behind schedule Qtrly, Milestone, or Phase Completion Reviews	MS Project (Estimating add-in) Excel Lotus	Get task leaders to cost out subtasks Include project costs to date
Updated Detailed Financial Status	Status Report For Qtrly, Milestone, or Phase Completion Reviews As required when ahead or behind schedule	MS Excel MS Word	Labor hours awarded vs. labor hours expended Dollars awarded vs. dollars expended
Updated Planned vs. Actual Spending Profile	Status Reports	Excel Lotus	Visual overview for upper management
Updated Staffing Profile	Status Report For Qtrly, Milestone, or Phase Completion Reviews As work product deliverable dates change	MS Project	Are there unacceptable peaks and valleys?
Updated Resource Loading	Status Report Qtrly, Milestone, or Phase Completion Reviews As deliverable dates change	Excel	Validate need for resources
Updated Risk Identification	Status Report	MS Word Automated project database	Update risk matrix Is risk mitigation required? Has a risk materialized?
Updated Work Packages	As required when work package is rescheduled, or changed	MS Word Automated project database	When requirements change Change Control List for Details
Updated Project Requirements	As required when requirements have been approved for change	MS Word Automated project database	Contract modification Change Control List for Details
Updated Quality Project Plan	As required Quarterly For Qtrly, Milestone, or Phase Completion Reviews	MS Word MS Project	Use baselined plan
Updated Configuration Management Plan	As required when ahead or behind schedule Status Report	MS Word MS Project	Use baselined plan
Updated Action Items	As required For weekly/ bi-weekly status meetings	MS Word Automated project database	Tracked until resolved Issue Resolution List for details
Updated Corrective Action Items	As required Status Report	MS Word Automated project database	Tracked until resolved

\*\* Listing as part of this sample matrix does not imply an endorsement by ITAB for use. The state organization should use tools that have been defined within their organization as standard and/or which best meet the automated support requirements of the project.

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### *Activity and Schedule Tracking*

A large part of the tracking and monitoring process is knowing the project's status. The only way to determine this is to:

- Review what activities were planned
- Determine that the work has been done to complete these activities
- Analyze whether the level of work is consistent with the level of effort that had been planned
- Compare this to the planned start and finish dates
- Determine if adjustments are needed for this activity
- Analyze if any required adjustments impact other tasks.

There are numerous ways to collect, analyze, and present this information. Two methods are presented here: Activity Tracking Table and Updated Project Schedule. For large, complex projects that have an involved activity network, additional levels of analysis and mathematical models would be needed. These tools should be used first to generate the project schedule during planning and should then continue to be used to track the schedule.

As can be seen in the Activity Tracking Table shown later in this section, a number of key tracking and monitoring activities are reflected. Included in the activity tracking table are:

- **WBS number.** This should be the activity's WBS number that was assigned during plan development or the number assigned at replanning.
- **Activity Description.** This is a brief narrative on the activity.
- **Dependency.** This would apply if the project reflects activity dependency, meaning one task cannot start and/or finish without the completion of another task.
- **Owner.** This should be the person who is responsible for updating the status on the task. It may or may not be the actual task manager.
- **Planned Schedule.** This information was generated as part of Project Planning. It would represent what was originally thought to be the number of days an activity would take, as determined by the date that the master activity list was generated. The second element of the activity in a bigger project schedule would show when the task would start and end, based on the duration.
- **Duration.** For the purposes of scheduling, duration should be in days, not hours. Hours are more of a financial element since they reflect the level of commitment and not the time. In other words, the purpose of the information in this table is not to show the number of people and hours being spent on a task (effort), but the elapsed days it will take.
- **Actual Schedule.** This information is completed as the activities are completed. Note that some of the 2.0 activities have no information filled in. This is because these tasks have not yet been completed.

# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

- **Target schedule.** This the planned schedule, with adjustments based on actuals. During the planning phase, the project manager allowed a few days “float” in the task 2.5, 2.6, 3.4 as a reserve for schedule risk, therefore the project remains on schedule.

During the process of establishing the project target, the project team now reviews the outstanding tasks and determines:

- Can the schedule slippage in 2.3 be made up in the other tasks? If so, where?
- Can the other tasks still be completed in the length of time planned? If so, where are additional adjustments required

To complete the projection for tasks that has not been started:

- Try to preserve “float” wherever possible.
- Ensure that logical discrepancies do not occur by attempting to override dependencies.
- Work up to the task level from the details. If an automated planning tool is being used on the project and a critical path has been established, the system will prevent the user from overriding the dependencies in the schedule.

### Activity Tracking Table

WBS	Activity Description	Depend	Owner	Planned Schedule			Actual Schedule			Target Schedule		
				Start	Finish	Dur.	Start	Finish	Dur.	Start	Finish	Dur.
<b>1.0</b>	<b>PLAN NETWORK INFRASTRUCTURE</b>		Brown	1/4/XX	2/26/XX	40	1/4/XX			1/4/XX	3/5/XX	45
1.1	Determine Current Environment		Brown	1/4/XX	1/14/XX	9	1/4/XX	1/14/XX	9	1/4/XX	1/14/XX	9
1.2	Establish General Req's	1.1	Brown	1/15/XX	2/11/XX	20	1/15/XX	2/11/XX	20	1/15/XX	2/11/XX	20
1.3	Create Conceptual Diagram of Network	1.2	Brown	2/12/XX	2/26/XX	11	2/12/XX			2/12/XX	3/5/XX	16
<b>2.0</b>	<b>INSTALL LAN IN ADMIN</b>		Brown	2/12/XX	4/29/XX	55	2/12/XX			2/12/XX	4/29/XX	55
2.1	Get Bids on Wiring and Equipment	1.2	Brown	2/12/XX	2/12/XX	1	2/12/XX	2/12/XX	1	2/12/XX	2/12/XX	1
2.2	Order Wiring, Hub, PCs, Servers, etc.	2.1	Brown	2/15/XX	2/15/XX	1	2/15/XX	2/15/XX	1	2/15/XX	2/15/XX	1
2.3	Install Wiring	2.2	Brown	2/16/XX	3/17/XX	22	2/16/XX			2/16/XX	3/23/XX	26
2.4	Receive and Store Equipment	2.3	Brown	3/18/XX	3/19/XX	2				3/24/XX	3/25/XX	2
2.5	Install Equipment	2.4, 1.3	Brown	4/1/XX	4/1/XX	1				4/1/XX	4/1/XX	1
2.6	Setup and Install Network Software	2.5	Brown	4/26/XX	4/26/XX	1				4/26/XX	4/26/XX	1
2.7	Setup Individual Workstations for Network Access	2.6	Brown	4/27/XX	4/29/XX	3				4/27/XX	4/29/XX	3
<b>3.0</b>	<b>Train Users</b>		Jones	2/12/XX	5/4/XX	58	2/12/XX			2/12/XX	5/4/XX	58
3.1	Define Training Requirements	1.2	Jones	2/12/XX	2/15/XX	2	2/12/XX	2/15/XX	2	2/12/XX	2/15/XX	2
3.2	Develop Training Plan	3.1	Jones	2/16/XX	2/19/XX	4	2/16/XX	2/19/XX	4	2/16/XX	2/19/XX	4
3.3	Develop Training Materials	3.2	Jones	2/22/XX	3/19/XX	20	2/22/XX			2/22/XX	3/29/XX	26
3.4	Conduct Training Sessions	3.3, 2.7	Jones	4/30/XX	5/4/XX	3				4/30/XX	5/4/XX	3
Comments: Though Task 1.3 and 2.3 have slipped, due to the planned start dates of later task, the project is still planned to end on the original finish date.												

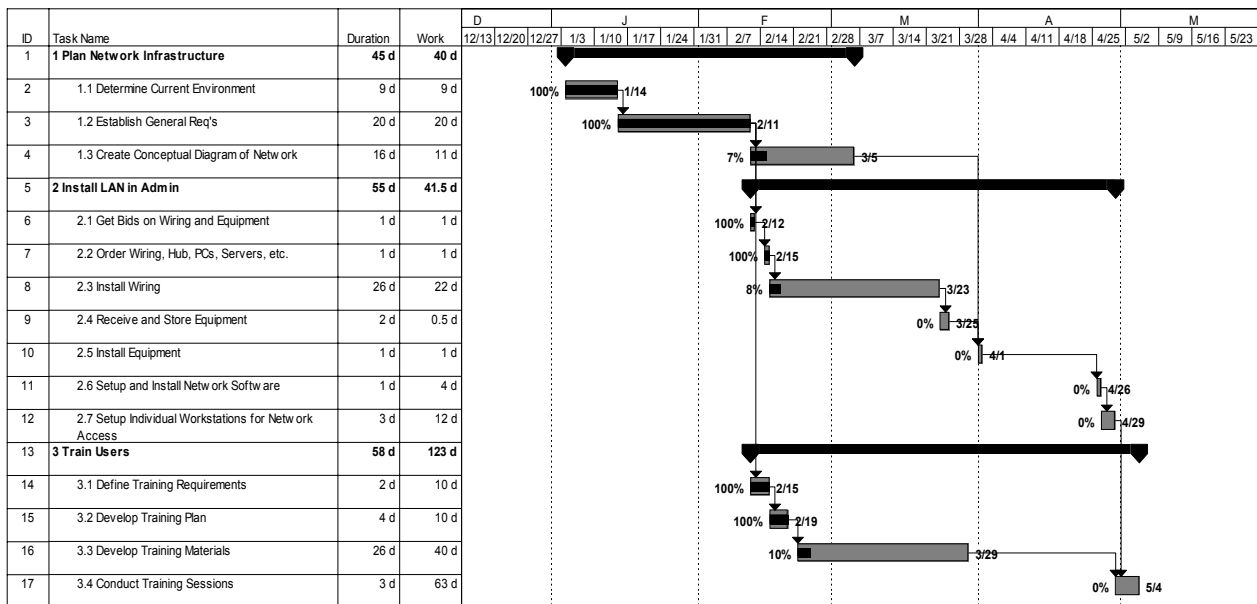
# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

Once the Activity Tracking Table is completed, the project manager can prepare a graphical presentation of this information. If an automated tool is being used, this graphic will be automatically generated. In most cases, the project manager has a choice in the graphical representation. At a minimum, it should be shown as a GANTT chart, as illustrated in the next figure. For this example, planned dates and duration are still shown on the schedule, even though the task has been completed.

The objective of tracking and monitoring is to preserve the original schedule (baseline) for comparison. In the above sample, the actual schedule is reflected for all those tasks completed. For tasks still open and ones that have not been completed, the new target schedule is reflected.

### Project Schedule Update

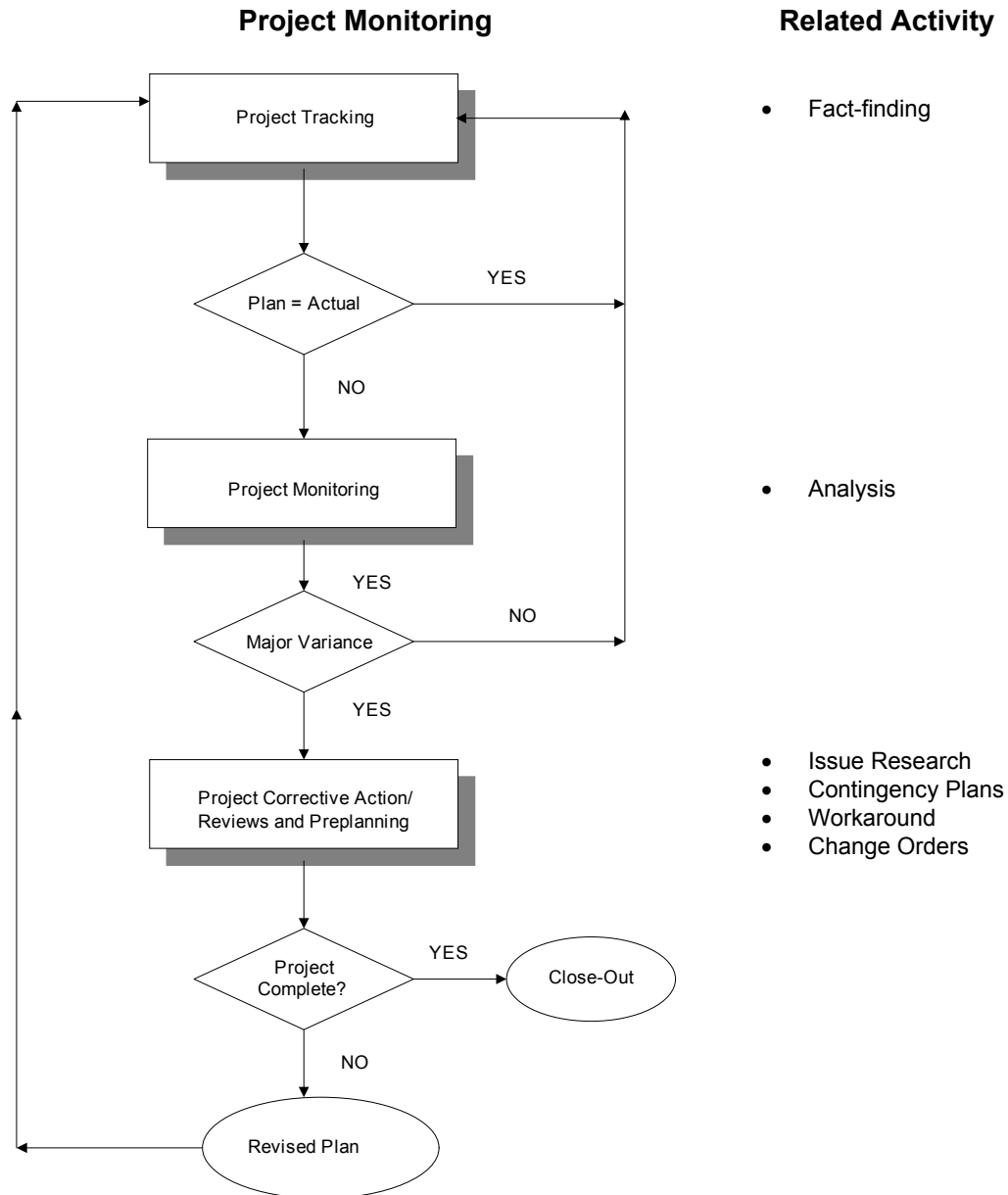


# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

### Monitoring

As is graphically presented below, the project monitoring process is an interactive part of tracking and is firmly tied to project planning. Project monitoring takes the outputs of tracking and uses them to determine planned versus actual.



# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### ***Planned Versus Actual Costs***

The basic consideration underlying all the elements of monitoring is “planned versus actual.” When the project manager completes this comparison, he/she then evaluates whether the existing plan can continue to be used, whether the activities can get back on plan, or whether the project (in whole or in part) has deviated significantly from the plan.

Cases where actual progress and projected progress differ significantly suggest the need for replanning, which would include updated project budgets. To determine what is “significant” deviation from the plan, a number of standards can be used. The CIO’s office is currently evaluating guidelines for over and under budget and expect to publish relevant policies before the next year.

The actual state organization and/or project can develop additional standards for determining “significant,” although these should not conflict with the statutory definition.

### ***Cost Determination***

The way to measure progress is through estimation and completion of tasks, deliverables and milestones. First, tasks during the planning cycle should be broken down into activities to permit progress to be monitored fairly frequently. Second, deliverables and milestones should be used as signposts to show progress. Budget updates are obtained from the people responsible for doing and managing the work efforts.

Cost of performing a task is directly related to the labor assigned to the task, the duration of the task, and the cost of any non-labor items required by the task. To develop updated costs and account for actuals, the project manager needs to review labor costs including labor cost burden and all related non-labor costs.

Estimating how much more time the task requires still remains the single most difficult part of deriving updated cost estimates. In calculating the cost of labor, costs must be burdened appropriately. Burdened cost typically refers to the overhead and general expenses that are beyond strict salary associated with an employee. Non-labor charges include such items as material costs, reproduction, travel, cost of capital (if leasing equipment), computer center charges, and equipment costs.

### ***Update the Cost Model***

Actual labor and non-labor cost information is compared to the numbers used to develop the plan. Spreadsheets work well for projects of small to medium scope. For large systems, a project management tool is typically preferred for cost estimation.

Within the system, costs are assigned and estimates updated at the lowest level WBS work package task. These costs are then combined to determine a sub-task cost, and in turn, are combined to determine the overall task cost, which can be summed to find the total project cost.

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### ***Document Assumptions***

It is essential to document all assumptions made while planning and updating the project budget. Not only can it greatly impact the later success of the project, but also the lack of such documentation can jeopardize the successful tracking to the budget.

If, for example, a budget assumed that a staff member would be available at a defined rate, but only substantially higher paid employees are available to perform the task, there will be a budget problem.

Detailed documentation may not always solve the problem, but it is invaluable in helping explain the problem.

### ***Tracking and Monitoring Costs***

Many projects can obtain useful financial status by generating a **Spending Profile** planned vs. actual spending profile graphic. This method is particularly useful for presentations to upper management because of its visual impact. The spending profile, as shown on the following page, can show in a glance what is happening with the project's costs.

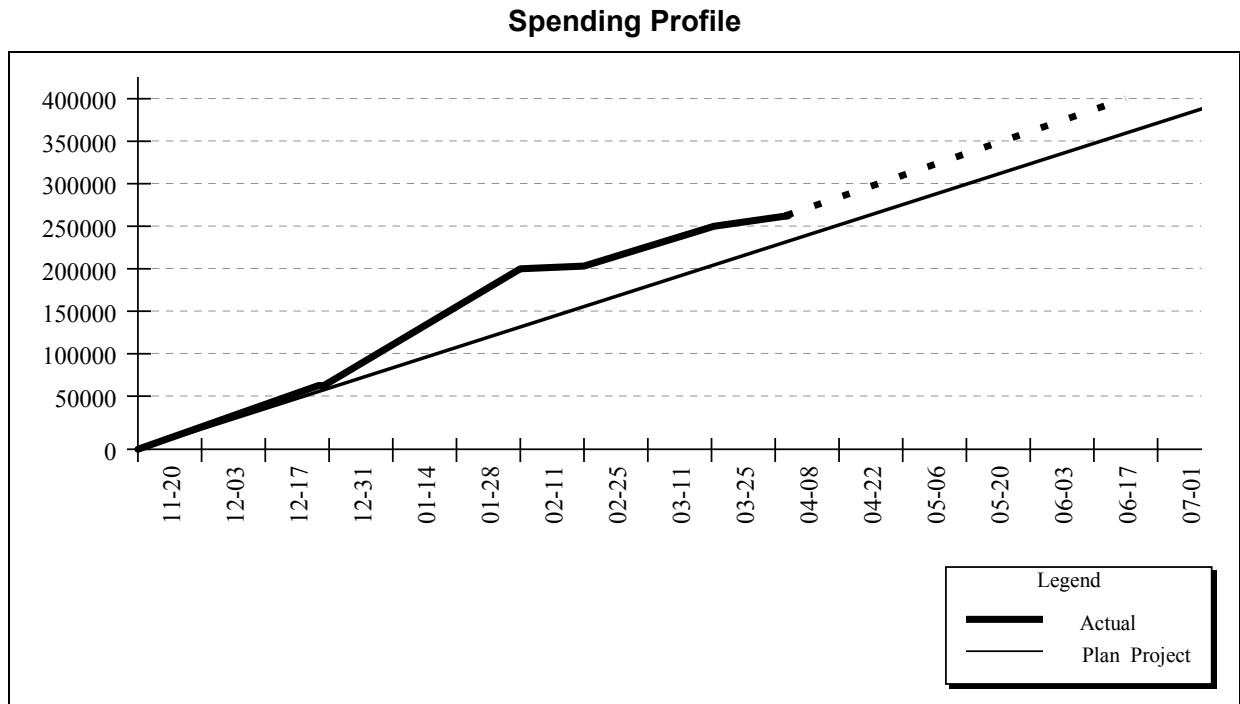
The basic financial tracking method is to prepare an **Estimated Cost at Completion (EAC)** Report.

Each project creates an EAC in the planning phase to identify the costs associated with each of the project's high level WBS elements, thereby developing an overall budget for the project. The EAC report generated in Execution phase shows the variation from the original plan.

Another financial tracking method is to maintain **financial metrics**. Projects that prepare monthly reports for a customer would be more likely to have a need to maintain financial metrics.

# Project Execution - PM Elements

## Tracking and Monitoring Project Performance



### ***Estimated Cost at Completion (EAC) Report***

An EAC periodically determines the expected total cost of the project at project completion. The EAC provides:

- An historical baseline of the budget.
- A disciplined process for obtaining inputs.
- A means of allocating and tracking budgets to manageable sizes.
- A library of metrics that can be updated with actuals throughout the life of the project for use on similar projects.

The EAC is an summary assessment of the total effort required to complete each task. It estimates the amount of effort required to complete each WBS element and adds that estimate to the costs incurred to date to derive the anticipated cost of each WBS element at project completion. A possible process for budget updates is detailed below:

- Start with the original EAC document from your project plan
- Calculate the estimated remaining cost
- Update costs incurred to date.



# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

- Sum the remaining estimates and the costs to date to derive an EAC for each WBS element.
- Sum the EACs for each WBS element to derive an EAC for the overall project.
- Determine the actual amount of funds available to the project.
- Compare the EAC to total funds available to the project.
- If the total available funds are less than the estimated total cost, then options include:
  - ⇒ Eliminate unneeded or excessive requirements until the remaining estimated cost is within the bounds of the remaining funds, or
  - ⇒ Advise executive management that current estimated scope of work for the project is greater than initially estimated.

A full EAC should be done for each status report and for all major contractual changes.

### Sample Estimated Cost at Completion Summary

WBS No.	Activity Description	Analysis in Hours					Analysis in Dollars				
		Budget Hours	Actual Hours	Est. to Complete	Est. @ Complete	Variance (+ = More)	Budget \$	Actual \$	Est. to Complete	Est. @ Complete	Variance (+ = More)
1.0	Define Requirements	430	600	0	600	170	17,780	26,000	0	26,000	8,220
2.0	Prepare RFP	572	500	50	550	(22)	22,880	17,000	1,900	18,900	(3,980)
3.0	Issue RFP and Evaluate Vendors	433	100	433	533	100	17,320	4,300	14,200	18,500	1,180
4.0	Close-Out	72	0	72	72	0	2,880	0	2,880	2,880	0
	<b>TOTAL</b>	1,507	1200	555	1,755	248	60,860	47,300	18,980	66,280	5,420

The financial information included in an EAC provides most of the budgetary numbers needed. What varies is the method by which the estimates to complete and at completion are done. Three variations on EAC are shown below:

EAC = Actuals to date plus the remaining project budget modified by the performance factor, often the cost performance index (CPI) developed as part of an Earned Value method of estimating. See the following section on Financial Metrics.

EAC = Actuals to date plus a new estimate for all remaining work. This approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed, or they were no longer relevant due to changes within the project environment.

EAC = Actual to date plus the remaining budget. This approach is most often used when current variances are seen as atypical and the project management team's expectations are that similar variances will not occur in the future.

Beware of the Trap to Report More Progress than has been Achieved.

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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### *Financial Metrics*

The following steps provide additional financial metrics that can further assist in determining if the project is “really” on schedule. This financial data, however, should not be used in isolation. Variance and earned value calculations are recommended to supplement other information. In general, the information only has value as it is tracked over time. Single statistics can be misleading.

- **Budgeted Cost for Work Scheduled (BCWS)**, the budgeted cost for work scheduled to be accomplished, plus the planned effort or apportioned effort scheduled to be accomplished in a given period and the level of effort budgeted to be performed. In other words, BCWS represents the plan that is to be followed. BCWS, as well as BCWP and ACWP can be calculated for any time period. However, cumulative totals tend to balance out previous time period fluctuations.
- **Budgeted Cost of Work Performed (BCWP)**, the budgeted amount of cost for completed work, plus budgeted for level of effort or apportioned effort activity completed within a given period of time. This is sometimes referred to as “earned value” and is a measure of work accomplished during a given period. Think always of BCWP as what you got for the effort expended. Tasks may be classified either as discrete or level of effort. If discrete, no credit is given for completing a task until it is done. If a task is level of effort, BCWP = BCWS.
- **Actual Cost for Work Performed (ACWP)**, the amount of cost actually expended in completing the work accomplished within a time period, plus the apportioned cost for level of effort activities.
- Calculate the **Cost Variance (CV)** by subtracting ACWP from the BCWP. A negative cost variance means that the project is spending more than it should.
  - **CV = BCWP - ACWP**
- Calculate the **Schedule Variance (SV)** by subtracting BCWS from BCWP. A negative schedule variance means the project is behind schedule.
  - **SV = BCWP - BCWS**
- Calculate the **Cost Performance Index (CPI)** by dividing BCWP by ACWP. The CPI is the cost efficiency factor representing the efficiency of work performed. The remaining budget of the project divided by the cumulative CPI is one approach to calculate the revised EAC total.

$$\text{CPI} = \frac{\text{BCWP}}{\text{ACWP}}$$

- Calculate the **Schedule Performance Index (SPI)** by dividing BCWP by BCWS. The SPI represents the schedule efficiency of work performed.

$$\text{SPI} = \frac{\text{BCWP}}{\text{BCWS}}$$

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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- Calculate the **Critical Ratio** by multiplying the CPI by the SPI. If the Critical Ratio is between .9 and 1.2, the task or group of task being analyzed is probably OK.
- **Critical Ratio = CPI X SPI**      or       $\frac{BCWP}{ACWP} \times \frac{BCWP}{BCWS}$
- Calculate the **Percent of Work Complete** by dividing the Cumulative BCWP by the Budget at Completion.

$$\% \text{ Complete} = \frac{BCWP}{\text{Budget at Completion}}$$

- Calculate the **Percent Spent** by dividing the cumulative ACWP by the Budget at Completion.

$$\% \text{ Spent} = \frac{ACWP}{\text{Budget at Completion}}$$

These variances should be plotted graphically and over time to show how the project team is doing. Cumulative statistics are best used for predicting future behavior. Current statistics or those calculated using only the most recent time period are best used for problem identification and analysis.

# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

### Resource Loading Updates

Updating the project resource plan is an important tracking event since shifts in this plan can cause major performance, cost, and schedule problems. The Resource Loading plan showing the number of personnel, by type, that were required on the project was developed as part of the planning process. As part of tracking, this information is compared regularly on a planned versus actual basis. Periodically, the project manager also validates whether these planned resources are still sufficient to complete the task on schedule and within budget given changing conditions.

Updating projected resource loading and staffing profiles, as shown below, helps the project manager adjust to these changing conditions by refining the estimated effort to complete the project, validating the continuing need for resources and identifying problems early in the project. By identifying and analyzing discrepancies, the project team can determine if adequate resources are being applied to the project and can get early indications that the project is falling behind schedule or is more complex than initially estimated.

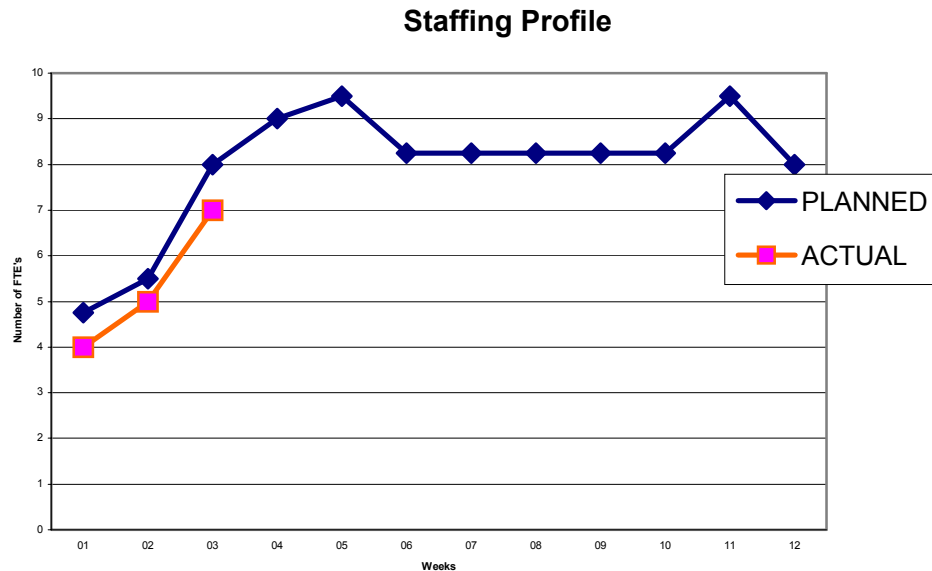
### FTE Resource Loading

POSITION	Wk. 1	Wk. 2	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	Wk. 11	Wk. 12
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1
SW Mgr	1	1	1	1	1	1	1	1	1	1	1	1
Sr. SW Eng.	1	1	1	1	1	1	1	1	1	1	1	1
SW Analyst	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1
Programmer			2	2	3	3	3	3	3	3	3	2
Config. Mgr			0.5	1	1	1	1	1	1	1	1	1
Tech Writer	0.5	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Support	0.25	0.5	0.5	1	1	0.25	0.25	0.25	0.25	0.25	1	0.5
Steering Committee	.2		.2		.2		.2		.2		.2	
Sponsor	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
<b>TOTAL</b>												
<b>PLANNED</b>	5.05	5.6	8.3	9.1	9.8	8.35	8.55	8.35	8.55	8.35	9.8	8.1
POSITION	Wk. 1	Wk. 2	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	Wk. 11	Wk. 12
Project Manager	1	1	1									
SW Mgr	1	1	1									
Sr. SW Eng.	1	1	1									
SW Analyst	1	1	1									
Programmer			2									
Config Mgr			1									
Tech Writer		1										
Support												
Steering Committee	.19		.21									
Sponsor	.1	.2	.01									
<b>TOTAL</b>												
<b>ACTUAL</b>	4.29	5.2	7.22									
<b>DIFFERENCE</b>	.76	.3	1.08									

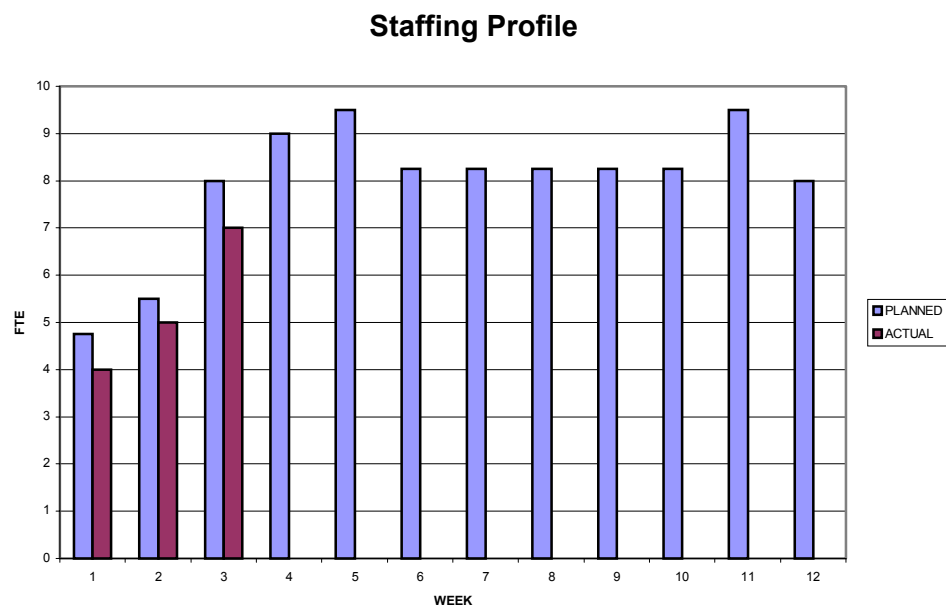
This same information can be graphically presented on a timeline with actuals compared to planned.

# Project Execution - PM Elements

## Tracking and Monitoring Project Performance



Lastly, this information can also be represented in a bar chart as shown in the next table so that actuals can be tracked as opposed to trends. This form of the Staffing Plan is sometimes referred to as a histogram.



# Project Execution - PM Elements

## Tracking and Monitoring Project Performance

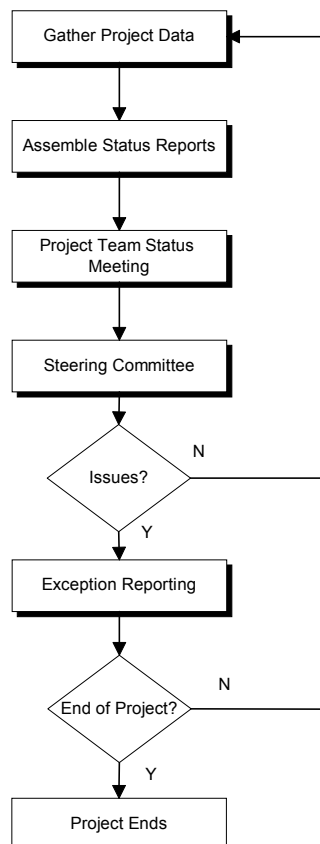
### Steering Committee

A standard requirement of all projects is to provide reports to the Steering Committee, the project team and executive management. At a minimum, the frequency of the reports should correspond with the meetings that are scheduled.

The information shared in the report should be in a consistent format throughout the project. The types of reports that a particular agency uses will vary. A general rule of thumb is that the detail should be kept to what can be explained during a Steering Committee Meeting. If more details are needed to clarify issues, then these should be provided as supplementary data.

Status reports are produced by key project team members. Status reporting is an integral part of the project management processes. It is the means by which the stakeholders stay informed about the progress and key activities required to successfully complete the project. The purpose of the status report, like the status meetings, is to develop a standard format for the formal exchange of information on the progress of the project. The status reporting process can be graphically represented as:

### Project Tracking and Reporting Process



# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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The status report package should be prepared by the project status team detailing activities, accomplishments, milestones, identified issues, and problems. Some level of recovery plans should be prepared for activities that are not on schedule and prevention plans prepared for anticipated problems.

Other information to be included in a status report package includes:

- Status Report form which include significant accomplishments for the period and scheduled activities
- Updated GANTT charts
- Recovery plans for activities not on schedule defined by the project team as being late, (e.g. slippage in the critical path activities)
- Updated Risk Management Worksheet
- Resolution to assigned action items and issues
- Updated Project Tradeoff Matrix and Status Summary
- Updated WPI
- Updated Estimated Cost at Completion
- Updated Staffing Plan with actuals
- Updated Activity Tracking Table
- Change Requests
- Financial Metrics
- Exception Reports addressing plan variations, e.g. crashing tasks, explaining cost overruns.

### ***Independent Reviews***

An important part of project evaluation is done by conducting an independent quality assurance or oversight review. For medium to large IT projects, project oversight or QA reviews should be done on a schedule consistent with the size and risk of the project.

Many state organizations are moving to the process of oversight reviews to augment their standard tracking process. These reviews provide the opportunity to have an independent appraisal of where the project stands and the efficiency and effectiveness with which the project is being managed. The independent reviewers are interested in the project's processes rather than the project products.

The purpose of the audit procedure is to ensure that the project plans are being adhered to and that any identified problems or deficiencies are resolved in a timely manner.

A sample independent review process is defined below.

- ⇒ Review the project as required for conformance to the applicable Project Implementation Plan, Software Development Plan, QA Plan, etc. This review includes

# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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the CM and data management process, the use of methodologies and tools identified in the project plans, the peer review process, and the walk through process.

- ⇒ Provide a summary report of each visit to the Project Manager. This report should clearly identify any deficiencies or problems encountered during the visit.
- ⇒ For projects with problems or deficiencies, work with the Project Manager to ensure that a plan is implemented to resolve the problems/deficiencies and schedule follow-up review to make sure that the problems/deficiencies have been resolved. If appropriate, the oversight report should be shared with the Project Sponsor.
- ⇒ Independent reviews work only if follow-up actions are taken to resolve any problems or deficiencies identified.

### ***Periodic Updates***

As shown in the Tracking Matrix earlier in this section, other tracking and monitoring activities may occur on a different frequency than the financial, budget, and status activities. Some of the periodic tracking processes are listed here.

- **Updating a Project's Work Assignments**

Each project identifies a series of work assignments for specific work to be accomplished. Work assignments are generally created to cover a specified subset of the project's overall requirements and are updated as project requirements change or as additional requirements are developed. It should be noted that work assignments are tracked until completion. The project team should update the following areas each time a work assignment is rescheduled, or changed:

- Work assignment description
- Person responsible for the work package
- Start date
- End date
- Dependencies
- Updated requirements.

- **Updating Project Requirements**

In the planning phase, each project must identify the high-level or general requirements that the project intends to satisfy. Like the work package, once identified, project requirements are tracked until completion.

Based on the change control processes, project requirements only change as a result of written notification and thorough review. Hence, project requirements will be updated as part of the change control process.



# Project Execution - PM Elements

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## Tracking and Monitoring Project Performance

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- **Updating the Quality Project Plan**

A Quality Activities matrix that lists project specific quality-related activities is required for each project. This matrix is initially developed in the project planning phase and is updated as project requirements change or as additional requirements are developed. The project team shall update the Quality Activities milestone schedule, as necessary, by:

- Adding or deleting quality activities
- Providing actual or revised quality activity completion dates as the project progresses.

- **Updating the Configuration Management Plan**

A Configuration Management Activities matrix that lists project specific CM-related activities is included in the project plan. This matrix is initially developed in the project planning phase and is updated as project requirements change or as additional requirements are developed. The PM shall update the CM activities schedule, as necessary, by:

- Adding or deleting CM Activities.
- Providing actual or revised CM activity completion dates as the project progresses.

## ***Managing External Project Managers***

As the project progresses, the internal project manager must continue to ask questions of the external project manager, i.e. contracted company, to determine the current state of the work. You should have regular status meetings, but there should be a formal quality assurance audit at the end of every major phase within a project.

The types of questions you would ask at that include:

- Have the deliverables specified in the that point would and project charter and WPI been completed up to this point?
- Have the appropriate deliverables been agreed to and approved by the steering committee or their designate?
- If the vendor has met expectations up to this point, have any interim payments been released?
- Can the vendor clearly explain where the project is verses where it should be at this time?
- Will all the future deliverables specified in the project definition be completed as planned?
- Are issues being resolved in a timely manner?
- Are scope change requests being managed according to agreed to policy?
- Are risks being identified and managed successfully?
- Should the contract or project definition be updated to reflect any major changes to the project?

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